İzmir Institute of Technology

INSTITUTE OF ENGINEERING AND SCIENCE(M.S.)
ENERGY ENGINEERING

ENE510	PRINCIPLES OF WIND ENERGY SYSTEMS				
Semester	**Course Unit Code**	**Course Unit Title**	**L+P**	**Credit**	**Number of ECTS Credits**
1	ENE510	PRINCIPLES OF WIND ENERGY SYSTEMS	3	3	8

Mode of Delivery:
Face to Face
Language of Instruction:
English
Level of Course Unit:
Second Cycle
Work Placement(s):
No
Department / Program:
ENERGY ENGINEERING
Type of Course Unit:
Required
Objectives of the Course:
The content of this course has been designed to make ready the student for the higher courses ENE511 and ENE512. It is recommended to be taken if the student has no background on wind energy. The goal is to create clear view about the wind energy and its applications for the student.
Teaching Methods and Techniques:
This course includes the history and near future of wind energy, the status of wind energy in turkey and around the globe, basic information about sub-topics of wind energy (i) meteorology (ii) aerodynamics and (iii) control. The content is supported with a site visit. The course gives knowledge and understanding on wind turbine peripherals/sections such as blades, rotor, gearbox, generator, brakes, nacelle, tower, grid connection and wind measurements.
Prerequisites and co-requisities:

Course Coordinator:
Asist Prof.Dr. Ferhat Bingöl
Name of Lecturers:
Asist Prof.Dr. Ferhat Bingöl
Assistants:

Recommended or Required Reading

Resources	Wind Energy Handbook, Tony Burton, Nick Jenkins, David Sharpe, Ervin Bossanyi, 2015 Course notes of the lecturer

Weekly Detailed Course Contents

Week	Topics	Study Materials	Materials
1	Introduction		
2	Wind as an energy source		
3	Measurement techniques, analysis and statistical methods		
4	Horizontal and vertical axes wind turbines		
5	Parts of a modern turbine		
6	Effective factors: turbulence, gust,extreme and wakes		
7	Basics of blade design and production		
8	Control and SCADA systems		
9	MID-TERM		
10	Power generation, generator types and principles		
11	Power and grid connection		
12	Assessment Techniques and Software		
13	Investment planing, free and feed-in-tarif market models		
14	Environmental impact of wind farms		
15	Turkish and global regulation and applications		
16	FINAL		

Course Learning Outcomes

No	Learning Outcomes
C01	Role of wind energy in Turkey, Europe and the Globe
C02	Knowledge on wind measurement techniques and basics of time series analysis
C03	Horizontal and Vertical Axes wind turbine and HAWT design parameters
C04	Feasibility of wind resources and basic calculation methods
C05	Blade design and production steps
C06	SCADA and control systems
C07	Generator types and working principles
C08	Power generation and grid connection
C09	Basic investment, cost, management and profit models
C10	Environmental impact of wind farms

Program Learning Outcomes

No	Learning Outcome
P03	to have the ability to use theoretical and practical knowledge at proficiency level about energy area,
P02	to be able to understand the interaction among disciplinary areas associated with energy area,
P01	to be able to enhance their knowledge based on bachelor science proficiency,
P06	to have the ability to conduct, solve and analyse the work requiring proficiency in energy area independently,
P05	to be able to analyse the problems related to energy by utilizing scientific methods,
P04	to have the ability to compose new knowledge by integrating and commenting knowledge of energy and other disciplines,
P09	to be able to communicate in mother tongue and at least one foreign language orally and written,
P08	to have the ability to publicize up-to-date enhancements and their own studies releated to energy for groups in energy area and others by means of written, visual and oral presentations systemati
P07	to be able to take responsibility and develop solutions for unexpected complex problems faced in energy area by leading and developing new strategies,
P12	to be able to utilize the knowledge obtained in energy area, solution and/or implementation skills for interdisciplinary works.
P11	to be able to consider social, scientific, culturel and ethic values at the levels of collecting, analysing, implementing and distributing of the data associated with energy,
P10	to have the ability to utilize sofware, which is required for energy area, informatique and communication technologies at advance level,

Assessment Methods and Criteria

In-Term Studies	Quantity	Percentage
Midterm exams	1	%35
Quizzes	0	%0
Homeworks	3	%15
Other activities	0	%0
Laboratory works	0	%0
Projects	0	%0
Final examination	1	%50
Total		**%100**

ECTS Allocated Based on Student Workload

Activities	Quantity	Duration	Total Work Load
Weekly Course Time	1	50	50
Outside Activities About Course (Attendance, Presentation, Midterm exam,Final exam, Quiz etc.)	3	20	60
Application (Homework, Reading, Self Study etc.)	0	0	0
Laboratory	0	0	0
Exams and Exam Preparations	2	65	130
Total Work Load			**240**
ECTS Credit of the Course			**8**

Contribution of Learning Outcomes to Programme Outcomes

Contribution: 0: Null 1:Slight 2:Moderate 3:Significant 4:Very Significant

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12
All	3	4	4	3	2	3	3	2	4	3	4	3
C01		3	3	2			4		4		4	
C02	4	4	4	4	4	4	2	2	4	4	4	4
C03	3	4	3	3	2	1	3	1	4	3	4	3
C04	4	4	4	2	4	4	2	4	4	4	4	4
C05	4	4	4	3	3	3	3	2	4	3	4	3
C06	4	4	4	3	2	2	2	2	4	3	4	2
C07	3	4	4	2	2	2	2	2	4	2	4	2
C08	3	4	4	2	2	2	2	2	4	2	4	2
C09	3	4	4	4	3	4	4	4	4	3	4	4
C10	3	4	4	4	2	3	3	2	4	2	4	3